



Decision Support for Chronic Management of Asthma

GLIDES PROJECT

GuideLines Into DEcision Support

sponsored by

the Agency for Healthcare Research and Quality



Yale School of Medicine



Asthma in Connecticut

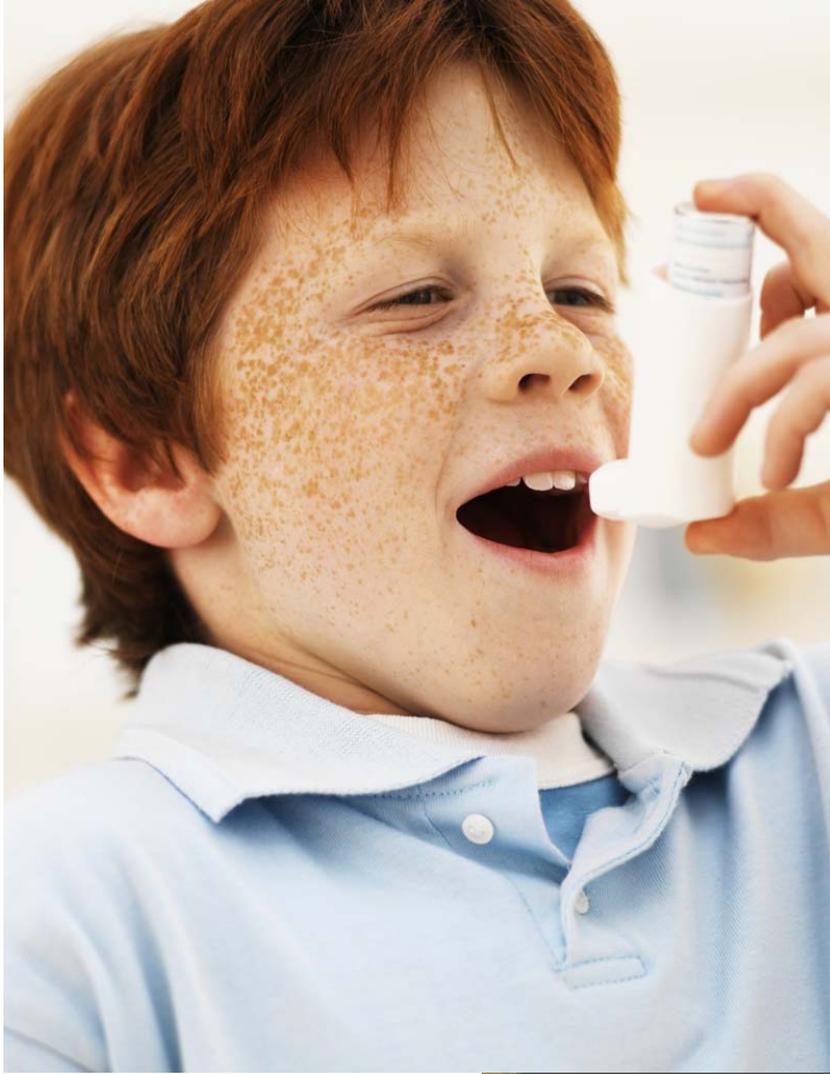
- 86,000 children in CT have asthma (9.7% of school population)
- Asthma prevalence is highest in the lowest income groups
- African-American and Hispanic children are hospitalized 5x as often as white children with asthma
- New Haven's rate of ED visits for asthma is second highest in CT
- Widespread lack of understanding about asthma causes, treatment and symptom prevention





Clinical Objectives

- Measure asthma control in a formalized manner
 - Optimize decision making; improve documentation of care, communication among providers
- Choose appropriate therapies
 - Prevent errors of omission/commission, optimize treatment
- Distribute a personalized asthma action plan
 - Improve patient empowerment, improve education, improve communication
- Improve provider satisfaction with CDSS





**National Heart, Lung,
and Blood Institute**

**National Asthma Education
and Prevention Program**

**Expert Panel Report 3:
Guidelines for the Diagnosis and
Management of Asthma**

Full Report 2007



FIGURE 4-3b. ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY IN CHILDREN 5-11 YEARS OF AGE

Components of Control		Classification of Asthma Control (5-11 years of age)		
		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2 days/week but not more than once on each day	>2 days/week or multiple times on ≤2 days/week	Throughout the day
	Nighttime awakenings	≤1x/month	≥2x/month	≥2x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta ₂ -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	Lung function			
	• FEV ₁ or peak flow	>80% predicted/ personal best	60-80% predicted/ personal best	<60% predicted/ personal best
	• FEV ₁ /FVC	>80%	75-80%	<75%
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	≥2/year (see note)	
		Consider severity and interval since last exacerbation		
	Reduction in lung growth	Evaluation requires long-term followup.		
	Treatment-related adverse effects	Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.		
Recommended Action for Treatment (See figure 4-1b for treatment steps.)		<ul style="list-style-type: none"> Maintain current step. Regular followup every 1-6 months. Consider step down if well controlled for at least 3 months. 	<ul style="list-style-type: none"> Step up at least 1 step and Reevaluate in 2-6 weeks. For side effects: consider alternative treatment options. 	<ul style="list-style-type: none"> Consider short course of oral systemic corticosteroids, Step up 1-2 steps, and Reevaluate in 2 weeks. For side effects, consider alternative treatment options.

Key: EIB, exercise-induced bronchospasm; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- The level of control is based on the most severe impairment or risk category. Assess impairment domain by patient's/caregiver's recall of previous 2-4 weeks and by spirometry/or peak flow measures. Symptom assessment for longer periods should reflect a global assessment such as inquiring whether the patient's asthma is better or worse since the last visit.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma control. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate poorer disease control. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.
- Before step up in therapy:
 - Review adherence to medications, inhaler technique, environmental control, and comorbid conditions.
 - If alternative treatment option was used in a step, discontinue it and use preferred treatment for that step.



FIGURE 4-3b. ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY IN CHILDREN 5-11 YEARS OF AGE

Components of Control		Classification of Asthma Control (5-11 years of age)		
		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2 days/week but not more than once on each day	>2 days/week or multiple times on ≤2 days/week	Throughout the day
	Nighttime awakenings	≤1x/month	≥2x/month	≥2x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta ₂ -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	Lung function			
	• FEV ₁ or peak flow	>80% predicted/ personal best	60-80% predicted/ personal best	<60% predicted/ personal best
	• FEV ₁ /FVC	>80%	75-80%	<75%
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	≥2/year (see note)	
	Reduction in lung growth	Consider severity and interval since last exacerbation		
	Treatment-related adverse effects	Evaluation requires long-term followup.		
Recommended Action for Treatment (See figure 4-1b for treatment steps.)		<ul style="list-style-type: none"> Maintain current step. Regular followup every 1-6 months. Consider step down if well controlled for at least 3 months. 	<ul style="list-style-type: none"> Step up at least 1 step and Reevaluate in 2-6 weeks. 	<ul style="list-style-type: none"> Consider short course of oral systemic corticosteroids. Step up 1-2 steps, and Reevaluate in 2 weeks. For side effects, consider alternative treatment options.

Key: EIB, exercise-induced bronchospasm; FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- The level of control is based on the most severe impairment or risk category. Assess impairment domain by patient's/caregiver's recall of previous 2-4 weeks and by spirometry/or peak flow measures. Symptom assessment for longer periods should reflect a global assessment such as inquiring whether the patient's asthma is better or worse since the last visit.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma control. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate poorer disease control. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.
- Before step up in therapy:
 - Review adherence to medications, inhaler technique, environmental control, and comorbid conditions.
 - If alternative treatment option was used in a step, discontinue it and use preferred treatment for that step.

CLASSIFYING COMPONENTS OF ASTHMA CONTROL

		----- Well Controlled -----		Not Well Controlled	Very Poorly Controlled									
Impairment	Cough	<input type="checkbox"/> None	<input type="checkbox"/> ≤2days/wk	<input type="checkbox"/> >2days/wk	<input type="checkbox"/> Daily									
	Wheezing	<input type="checkbox"/> None	<input type="checkbox"/> ≤2days/wk	<input type="checkbox"/> >2days/wk	<input type="checkbox"/> Daily									
	Chest tightness	<input type="checkbox"/> None	<input type="checkbox"/> ≤2days/wk	<input type="checkbox"/> >2days/wk	<input type="checkbox"/> Daily									
	Shortness of breath	<input type="checkbox"/> None	<input type="checkbox"/> ≤2days/wk	<input type="checkbox"/> >2days/wk	<input type="checkbox"/> Daily									
	Nighttime awakening	<input type="checkbox"/> None	<input type="checkbox"/> ≤1x/month	<input type="checkbox"/> ≥2x/month	<input type="checkbox"/> ≥2x/wk									
	Interference with normal activity	<input type="checkbox"/> None		<input type="checkbox"/> Some limitation	<input type="checkbox"/> Extremely limited									
	SABA use (not for EIB)	<input type="checkbox"/> None	<input type="checkbox"/> ≤2days/wk	<input type="checkbox"/> >2days/wk but not daily	<input type="checkbox"/> Several times per day									
Risk	FEV1 or peak flow		<input type="checkbox"/> >80% predicted	<input type="checkbox"/> 60-80% predicted	<input type="checkbox"/> <60% predicted									
	FEV1/FVC		<input type="checkbox"/> >80%	<input type="checkbox"/> 75-80%	<input type="checkbox"/> <75%									
	Acute/ER visit(s) due to asthma	<input type="checkbox"/> 0	<input type="checkbox"/> 1 in last year	<input type="checkbox"/> 2 in last year	<input type="checkbox"/> ≥3 in last year									
	Hospitalizations due to asthma	<input type="checkbox"/> 0	<input type="checkbox"/> 1 in last year	<input type="checkbox"/> 2 in last year	<input type="checkbox"/> ≥3 in last year									
	Exacerbations requiring oral steroids	<input type="checkbox"/> 0-1/year		<input type="checkbox"/> ≥2/year										
	Treatment-related adverse effects	<table border="1"> <thead> <tr> <th>Medication Adverse Effect</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> Thrush</td> <td rowspan="5"></td> </tr> <tr> <td><input type="checkbox"/> Palpitations</td> </tr> <tr> <td><input type="checkbox"/> Jitteriness</td> </tr> <tr> <td><input type="checkbox"/> Sleep Disturbances</td> </tr> <tr> <td><input type="checkbox"/> Decreased Growth</td> </tr> <tr> <td><input type="checkbox"/> Other</td> </tr> </tbody> </table>			Medication Adverse Effect	Comments	<input type="checkbox"/> Thrush		<input type="checkbox"/> Palpitations	<input type="checkbox"/> Jitteriness	<input type="checkbox"/> Sleep Disturbances	<input type="checkbox"/> Decreased Growth	<input type="checkbox"/> Other	
Medication Adverse Effect	Comments													
<input type="checkbox"/> Thrush														
<input type="checkbox"/> Palpitations														
<input type="checkbox"/> Jitteriness														
<input type="checkbox"/> Sleep Disturbances														
<input type="checkbox"/> Decreased Growth														
<input type="checkbox"/> Other														



		----- Well Controlled -----		Not Well Controlled	Very Poorly Controlled
Impairment	Cough	<input type="checkbox"/> None	<input type="checkbox"/> <=2days/wk	<input checked="" type="checkbox"/> >2days/wk	<input type="checkbox"/> Daily
	Wheezing	<input type="checkbox"/> None	<input checked="" type="checkbox"/> <=2days/wk	<input type="checkbox"/> >2days/wk	<input type="checkbox"/> Daily
	Chest tightness	<input type="checkbox"/> None	<input checked="" type="checkbox"/> <=2days/wk	<input type="checkbox"/> >2days/wk	<input type="checkbox"/> Daily
	Shortness of breath	<input checked="" type="checkbox"/> None	<input type="checkbox"/> <=2days/wk	<input type="checkbox"/> >2days/wk	<input type="checkbox"/> Daily
	Nighttime awakening	<input type="checkbox"/> None	<input type="checkbox"/> <=1 x/month	<input checked="" type="checkbox"/> >=2x/month	<input type="checkbox"/> >=2x/wk
	Interference with normal activity	<input checked="" type="checkbox"/> None		<input type="checkbox"/> Some limitation	<input type="checkbox"/> Extremely limited
	SABA use (not for EIB)	<input type="checkbox"/> None	<input type="checkbox"/> <=2days/wk	<input checked="" type="checkbox"/> >2days/wk but not daily	<input type="checkbox"/> Several times per day
	FEV1 or peak flow		<input type="checkbox"/> >80% predicted	<input type="checkbox"/> 60-80% predicted	<input type="checkbox"/> <60% predicted
	FEV1/FVC		<input type="checkbox"/> >80%	<input type="checkbox"/> 75-80%	<input type="checkbox"/> <75%
Risk	Acute/ ER visit(s) due to asthma	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1 in last year	<input type="checkbox"/> 2 in last year	<input type="checkbox"/> >=3 in last year
	Hospitalizations due to asthma	<input checked="" type="checkbox"/> 0	<input type="checkbox"/> 1 in last year	<input type="checkbox"/> 2 in last year	<input type="checkbox"/> >=3 in last year
	Exacerbations requiring oral steroids	<input checked="" type="checkbox"/> 0-1/year		<input type="checkbox"/> >=2/year	
	Treatment-related adverse effects	Medication Adverse Effect <input type="checkbox"/> Thrush <input type="checkbox"/> Palpitations <input type="checkbox"/> Jitteriness <input type="checkbox"/> Sleep Disturbances <input type="checkbox"/> Decreased Growth <input type="checkbox"/> Other			Comments None



Behind the Scenes

- Save each symptom and its frequency for consultant's letter
- Interpret Impairment: None, Mild, Moderate, Severe
- Interpret Risk: Low, Moderate, High
- Interpret Control: Well-controlled, Not well-controlled, Very poorly



Problems	Medications	Allergies
ECZEMA (ICD-691.8) ALLERGIC RHINITIS (ICD-477.9) ASTHMA, MILD PERSISTENT (ICD-493.90)	SINGLAIR CHEW 5 MG (MONTELUKAST SODIUM) 1 tablet by mouth at night VENTOLIN HFA 2 puffs via spacer as needed for symptoms up to every 4 hours FLOVENT HFA AERO 44 MCG/ACT (FLUTICASONE PROPIONATE (INHAL.)) 2	

Decision Support Assessment

Control Classification: Hot Well Controlled

Impairment: Moderate

Risk: Low

Contributing Factors

Adherence good fair poor

Inhaler technique correct incorrect

Envir. control adequate inadequate

Control Classification on 01/21/2009

Control Classification: Hot Well Controlled

Impairment: Moderate

Risk: Low

Contributing Factors

Adherence good fair poor

Inhaler technique correct incorrect

Envir. control adequate inadequate

Severity Classification on 01/21/2009

Severity Classification: Mild Persistent

Severity Classification on 01/21/2009

Severity Classification: Mild Persistent

Provider Assessment

Provider Asthma Re-Classification: Intermittent Mild Persistent Moderate Persistent Severe Persistent

Current level of control is: Well Controlled Not Well Controlled Very Poorly Controlled

Current limitations in control are, in part, due to problems in adherence. Pt reports missing controller med 2 days/wk on average. Complex caretaking arrangements.

Active Problems List:

- ECZEMA (ICD-691.8)
- ALLERGIC RHINITIS (ICD-477.9)
- ASTHMA, MILD PERSISTENT (ICD-493.90)

Copy Selected Problems to Comments

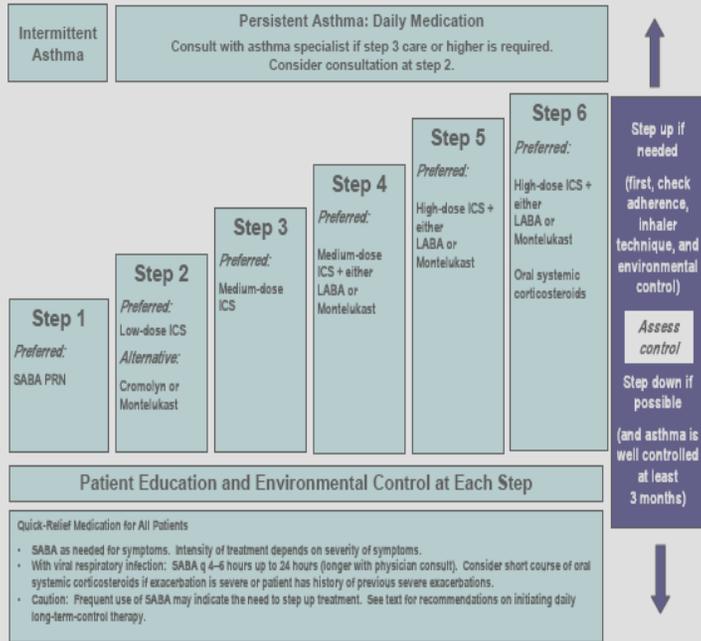
Additional Diagnosis

Interval Hx	ROS	Environ Hx	Phys Exam	Test	Treat Plan
Sev/Ctrl	Assessment	Steps	Meds	Plan	Prescrip

Prev Form (Ctrl+PgUp) Next Form (Ctrl+PgDn) Close



FIGURE 4-1a. STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 0-4 YEARS OF AGE



Key: Alphabetical order is used when more than one treatment option is listed within either preferred or alternative therapy. ICS, inhaled corticosteroid; LABA, inhaled long-acting beta₂-agonist; SABA, inhaled short-acting beta₂-agonist

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- If alternative treatment is used and response is inadequate, discontinue it and use the preferred treatment before stepping up.
- If clear benefit is not observed within 4-6 weeks and patient/family medication technique and adherence are satisfactory, consider adjusting therapy or alternative diagnosis.
- Studies on children 0-4 years of age are limited. Step 2 preferred therapy is based on Evidence A. All other recommendations are based on expert opinion and extrapolation from studies in older children.

Recommended Step for Asthma Management

*** Selected step in the last visit: 2 ***

Intermittent Asthma	Persistent Asthma: Daily Medication				
<input type="radio"/> Step 1 Preferred: SABA PRN	<input type="radio"/> Step 2 Preferred: Low-dose ICS Alternative: Cromolyn, LTRA, Nedocromil Consider consultation	<input checked="" type="radio"/> Step 3 Preferred: Low-dose ICS + either LABA, LTRA, or COMBO OR Medium-dose ICS Consult Asthma Specialist	<input type="radio"/> Step 4 Preferred: Medium-dose ICS + LABA, or COMBO Alternative: Medium-dose ICS + LTRA Consult Asthma Specialist	<input type="radio"/> Step 5 Preferred: High-dose ICS + LABA, or COMBO Alternative: High-dose ICS + LTRA Consult Asthma Specialist	<input type="radio"/> Step 6 Preferred: High-dose ICS + LABA, or COMBO + oral systemic corticosteroid Alternative: High-dose ICS + LTRA + oral systemic corticosteroid Consult Asthma Specialist
<<==== Step down if possible (If asthma is well controlled at least 3 months)		Step up if needed =====>> (adherence, inhaler technique, and environmental control)			
Patient Education and Environmental Control at Each Step					
Quick-Relief Medication for All Patients [†] SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute interval as needed. Short course of oral systemic corticosteroids may be needed. [‡] Caution: Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.					
Comments/Reason for variance: <input style="width: 100%; height: 20px;" type="text"/>					



According to EPR3, this patient meets criteria for Step 3

Intermittent Asthma		Persistent Asthma: Daily Medication				
<input type="radio"/> Step 1 Preferred: SABA PRN		<input type="radio"/> Step 2 Preferred: Low-dose ICS Alternative: Cromolyn, LTRA, Nedocromil Consider consultation	<input checked="" type="radio"/> Step 3 Preferred: Low-dose ICS+ either LABA, LTRA, or COMBO OR Medium-dose ICS Consult Asthma Specialist	<input type="radio"/> Step 4 Preferred: Medium-dose ICS+LABA, or COMBO Alternative: Medium-dose ICS+LTRA Consult Asthma Specialist	<input type="radio"/> Step 5 Preferred: High-dose ICS+LABA, or COMBO Alternative: High-dose ICS+LTRA Consult Asthma Specialist	<input type="radio"/> Step 6 Preferred: High-dose ICS+LABA, or COMBO+ oral systemic corticosteroid Alternative: High-dose ICS+ LTRA + oral systemic corticosteroid Consult Asthma Specialist
<<==== Step down if possible (if asthma is well controlled at least 3 months)			Step up if needed >>>> (adherence, inhaler technique, and environmental control)			

Patient Education and Environmental Control at Each Step

Quick-Relief Medication for All Patients

- * SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute interval as needed. Short course of oral systemic corticosteroids may be needed.
- * Caution: Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.

Comments/Reason for variance:



Problems	Medications	Allergies
ECZEMA (ICD-691.8) ALLERGIC RHINITIS (ICD-477.9) ASTHMA, MILD PERSISTENT (ICD-493.90)	SINGULAIR CHEW 5 MG (MONTELUKAST SODIUM) 1 tablet by mouth at night VENTOLIN HFA 2 puffs via spacer as needed for symptoms up to every 4 hours FLOVENT HFA AERO 44 MCG/ACT	
Update Problems	Update Meds	Update Allergies

Selected Treatment Step : 3

Quick-Relief
Short acting B-2 agonist [NEW ORDER](#) [REFILL](#)

Long Term Control
Preferred

1. Low-dose inhaled steroid [NEW ORDER](#) [REFILL](#)
or
LTRA [NEW ORDER](#) [REFILL](#)
or
2. COMBO: [NEW ORDER](#) [REFILL](#)

3. Medium-dose inhaled steroid [NEW ORDER](#) [REFILL](#)

[Back to Steps](#)

Interval Hx	Environ Hx	ROS	Phys Exam	Treat Plan	Test
Assessment	Prescrip	Sew/Ctrl	Steps	Plan	



Problems	Medications	Allergies
ECZEMA (ICD-691.8) ALLERGIC RHINITIS (ICD-477.9) ASTHMA, MILD PERSISTENT (ICD-493.90)	SINGULAIR CHEW 5 MG (MONTELUKAST SODIUM) 1 tablet by mouth at night VENTOLIN HFA 2 puffs via spacer as needed for symptoms up to every 4 hours FLOVENT HFA AERO 44 MCG/ACT	

Update Problems

Update Meds

Update Allergies

Quick-Relief

Selected Treatment Step : 3

Short acting B-2 agonist

VENTOLIN HFA 108 (90 Base) MCG/ACT AERS

NEW ORDER

REFILL

Quick-Relief

Long Term Control

Preferred

Long Term Control

1. Low-dose inhaled steroid

[Dropdown menu]

NEW ORDER

REFILL

or

LTRA

1. Low-dose inhaled steroid

FLOVENT 44 MDI 1 puff BID

NEW ORDER

REFILL

or

LTRA

FLOVENT 44 MDI 2 puffs BID

NEW ORDER

REFILL

or

PULMICORT 0.25 MG BID

NEW ORDER

REFILL

or

PULMICORT .5mg once a day

NEW ORDER

REFILL

or

PULMICORT DPI 90 mcg 1 puff BID

NEW ORDER

REFILL

2. COMBO:

2. COMBO:

PULMICORT DPI 90 mcg 2 puffs BID

NEW ORDER

REFILL

3. Medium-dose inhaled steroid

[Dropdown menu]

NEW ORDER

REFILL

Back to Steps

Environ Hx	ROS	Interval Hx	Phys Exam	Treat Plan	Test
Prescrip	Seu/Ctrl	Assessment	Steps	Plan	



Select Button to Generate Plan for each Zone

Generate New Plan for Zones

Copy Previous Plan to Zones

Green Zone - GO!

Continue Well Program
Preventive Plan

Plan: Well Program

SINGULAIR CHEW 5 MG (MONTELUKAST SODIUM) 1 tablet by mouth at night
FLOVENT HFA AERO 44 MCG/ACT (FLUTICASON PROPIONATE (INHAL)) 2 puffs
via spacer twice a day, rinse mouth after use

Yellow Zone - CAUTION!

Plan: 2 puffs via spacer or 1 vial via nebulizer up to every
four hours. ADD the following medication(s) to the above Well Program

If you are in the YELLOW Zone
or are experiencing symptoms
(COUGH/WHEEZE)

- * Check peak flow again in 15 minutes after using Proventil
- * If NO improvements in peak flow or symptoms,
Call your PRIMARY CARE PROVIDER.
- * If results last less than 4 hours,
Call your PRIMARY CARE PROVIDER.
- * If you are requiring Proventil every 4 hours for longer than 2 days,
Call your PRIMARY CARE PROVIDER.

Red Zone - DANGER

Plan Follow this plan

If you ARE NOT having difficulty
breathing.

- * Proventil 4 puffs via spacer or one vial via nebulizer now and call your
Primary Care Provider for futher plan
Call your PRIMARY CARE PROVIDER.

If you ARE having difficulty breathing
(Nostrils Flaring, Difficult Talking,
Breathing Faster, Rib Cage Sinks in
while Breathing, Lethargy)

- * Proventil 4 puffs via spacer or one vial via nebulizer now
- * GO Directly to the EMERGENCY ROOM or Call 911

Medication Authorization Form - First Med

Personnel to Administer:

Drug: Dose: Rte:

Total # doses in 24 hour: # doses at home

Admin 15-30 minutes prior to e
 PRN for wheezing
 Once daily

Comments:

Administered from: to

Relaxant side effects:

Prev Form (Ctrl+PgUp)

Next Form (Ctrl+PgDn)

Medication Authorization Form - 2nd Med

Personnel to Administer:

Drug: Dose: Rte:

Total # doses in 24 hour: # doses at home

Admin 15-30 minutes prior to e
 PRN for wheezing
 Once daily

Comments:

Administered from: to

Relaxant side effects:

Close



Clinical Objectives

- Measure asthma control in a formalized manner
- Choose appropriate therapies
- Distribute a personalized asthma action plan
- Improve provider satisfaction with CDSS